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Remarks on Some of the Diseases of Dairy Cattle*

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Owing to the high incidence of disease in dairy herds the treatment of ailments of the bovine species constitutes the greater portion of practice in rural districts. This high incidence of contagious and other diseases is to a great extent due to modern methods of husbandry. But the intensive system has come to stay and it is incumbent on our profession, not only to combat but to obviate, as far as possible, the evils resulting from high production, artificial feeding and insufficient ventilation.

It is computed that the useful life of a dairy cow is eight or nine lactations of which the fourth, fifth, and sixth are the most productive; yet, chiefly on account of disease, the average works out at less than five lactations. This is due to the fact that 25 to 30 per cent. of the members are eliminated annually from the ordinary dairy herd for various reasons.

The Committee on Cattle Diseases of the Economic Advisory Council in their Report set forth the causes which lead to these eliminations. They do not claim a great degree of accuracy for them, but, as they are given after the examination of 2,830 herds comprising 78,905 cattle, they must be of considerable value. They are as follows:—

1. Diseases of the reproductive organs:		
(*a*) Sterility	23·8	
(*b*) Abortion	3·0	
		26·8
2. Udder disease		7·7
3. Tuberculosis, Johne's disease and wasting		9·7
4. Death and miscellaneous diseases ...		10·4
5. Tuberculin test		3·6
Total from disease		58·2
6. Old age		4·3
7. Accident		1·5
8. Low Yield		17·7
9. Trade		18·3
Total		100·0

Included among "miscellaneous" presumably would be such affections as milk fever, lactation tetany, acetonaemia, etc. With these I shall not have time to deal to-night.

Referring back to the Report, sterility heads the list as a cause of 23·8 per cent. of eliminations. One is, I think, justified in assuming that specific causes were operating in a large proportion of these cases. Individual cows may not come in oestrum because of defect of the anterior pituitary (which probably is extremely rare), because of hypoplasia of the ovary (which is also rare), because of disease of the ovary or the presence of a persistent corpus luteum. Failure to conceive, apart from disease or defect of the genital tract of the bull, may be due to death of the sperm before reaching the ovum, to displacement or atresia of the os uteri or to acidity of the vaginal secretions but, in the vast majority of cases, it is due to a cervicitis, a vaginitis or an endometritis. Factors which adversely affect the activity of the essential organs are deficiencies in the diet, obesity, confinement, delay in breeding and debilitating or inflammatory conditions.

A thorough examination is necessary in each case in order to ascertain the cause; the ovaries and uterus should be palpated per rectum and the vagina and cervix inspected carefully. Any abnormality should be treated. If no definite cause can be found the general system should be toned up, dietary attended to (with, if possible, a run at grass) and after a time, if there is no evidence of heat, one may give yohimbine, anterior pituitary or thyroid extract. Expression of the corpus luteum is not always easy or safe. In such cases Tutt[1] recommends oestradiol benzoate in oily solution (Provetan) [*V.R.* **51.** 438].

Bovine sterility is very ably dealt with in an address by Professor Craig.[2]

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Acidity of the vagina is easily determined by the use of litmus paper. If not accompanied by inflammation the injection of 1 or 2 per cent. solution of sodium bicarbonate daily on a few occasions before the appearance of oestrus usually results in conception. This solution also removes any thick mucus, the presence of which inhibits movement of the spermatozoa.

Inflammation of the vagina occurs in coital exanthema, the venereal form of cow pox, contagious granular vaginitis, and trichomonas infection or it may follow a metritis. The two former conditions are rarely responsible for death of the spermatozoa but sterility has been associated with the two latter conditions. When metritis is not preceded by retention of the foetal membranes or dystocia it is probably due to a specific cause.

There is reason to believe that trichomonas infection is rife in many herds, unsuspected or suspected but not confirmed. Failure to make a definite diagnosis is due to the difficulty of demonstrating the parasite in vaginal mucus or smears from the prepuce of the bull. A good deal of research has been carried out on this disease during the past few years. It was first discovered by Mazzanti in Italy in 1900 but little notice seems to have been taken of it until Riedmüller[3] described it in Germany in 1928. Next came Schmidt[4] of U.S.A.; Stableforth, Scorgie and Gould[5] described it in England in 1937 and Lamont and Kerr[6] in Ireland in 1938. It has now been reported on by several research workers, including Cameron in Canada and Futamura in Japan.

According to research and field workers the parasite is most readily discovered in the discharges: (1) during oestrus, (2) within 48 hours after abortion, (3) two or three days after infection, but in acute cases only, (4) in pyometra when other organisms are not present, (5) in the abomasum and other organs of the foetus (when sufficiently developed) and foetal membranes. When the disease has become latent, one's best chance of retrieving the parasite is by flushing out the genital tract with sterile normal saline solution, centrifugalising the recovered fluid and examining the deposit.

In material examined while fresh the actively motile parasite is readily seen under the one-sixth objective with the light cut down. If not readily found the smear should be searched with the low power as this covers a much wider field. Dead trichomonads are not easily easily distinguished from the surrounding debris and known methods of staining are not very satisfactory.

The organism is a flagellate protozoan. It is roughly oval in shape, provided with three anterior flagella about the same length as the body and a fourth filament which arises a little behind the anterior flagella and runs back over about two-thirds of the length of the body, to which it is attached by a vibratile or undulating membrane, to end in a free flagellum at the posterior end. It measures 9 to 20 microns in length and 4 to 8 microns in width. Movement is very active unless the material is mucoid or viscid, as it usually is in chronic cases, when motility is markedly decreased. Sometimes, however, movement appears as if by means of pseudopodia. Examination should be made within a few hours after specimens are taken. In samples 24 hours' old, unless kept moist in the incubator, parasites are usually dead.

Its habitat in the female may be anywhere between the vulva and the cornua of the uterus, favouring the neighbourhood of the external orifice of the cervix; in the male the folds and crevices of the lining membrane of the prepuce. The parasite can now be grown on artificial media. Transmission of the disease occurs only by coitus or artificial infection of the genital mucous membrane. In the early stages of infection symptoms may or may not be noted. The usual history is that several animals have returned to the bull after having passed two or three periods and been thought in calf. As a rule the disease is not recognised until a large part of the herd is affected and cases of early abortion or pyometra have been observed. It may have been noted that these cases are associated with a particular bull.

In the first instance infection of the bull usually results in inflammation of the prepuce. Within a few days there is swelling and hyperaemia of its mucous membrane and of that of the penis, followed by a more or less profuse muco-purulent discharge. The animal shows pain and may refuse to serve. If the penis be examined at this stage evenly distributed red nodules, millet seed in size, will be found on its mucosa. After a week or two the acute inflammation subsides, the nodules become grey and after several weeks disappear, but the bull remains permanently infected. Frequently, however, acute symptoms are not noted in the bull.

In the cow, symptoms depend on the age of the animal and the stage of infection of the bull at the time of service. Heifers and young cows are more prone to the acute form of the disease than older animals and a bull in the acute stage is more likely to transmit the acute form.

After infection of the female any of the following conditions may result:—

(1) Within three days after service a discharge from the vulva accompanied by vaginitis, and uterine catarrh. The discharge may be muco-purulent or mucoid with small white

flakes. On examination of the mucous membrane red seed-like nodules may be noted especially around the cervix, but the value of these as an aid to diagnosis is debatable.

Fertilisation is prevented by the uterine catarrh and after several attempts to get her in calf the cow is sent to another bull. Thus the disease is spread further.

(2) No recognisable symptoms appear after service but months later maceration of the foetus takes place with pyometra and persistent corpus luteum. The condition may not be noted until the animal is due to calve because the vagina appears normal and the cervix is sealed. The cervix may relax as the end of the normal gestation period approaches or it may remain closed.

(3) Although no symptoms appear after service, some weeks later a "pea soup" or a watery discharge is emitted through a patent os uteri. This discharge may persist for some time or it may be periodic.

(4) There are no apparent symptoms after service but, after a period varying between three and sixteen weeks, a watery discharge appears and is immediately followed by abortion. Oestrus becomes regular again but the animal returns to the bull time after time. Abortion at this early period may easily have escaped notice.

Owing to the variety of symptoms displayed it is obvious that attention must be paid to the general history of the herd. Early abortion, frequent vaginal discharge, pyometra and persistent sterility should arouse suspicion. Confirmation of diagnosis by demonstration of the parasite is often very difficult. The disease may be distinguished from:—

(*a*) Coital exanthema. Here there is acute inflammation in all cases. The animal holds the tail away from the vulva, swishes it constantly and urinates frequently. In the vagina vesicles or pustules form and rupture leaving small ulcers. Abortion or pyometra do not occur.

(*b*) Contagious granular vaginitis is not associated with much discharge, with abortion or pyometra. The red nodules which form early are succeeded by greyish or greenish postules which appear in parallel rows in the neighbourhood of the clitoris.

(*c*) Bang's disease may complicate trichomonad infection but abortion due to *Br. abortus* occurs later—usually between the fourth and eighth month. Laboratory examination of the stomach of the foetus will differentiate.

(*d*) Pyometra or endometritis due to other organisms may be distinguished by microscopic and cultural examination. It must be borne in mind, however, that the presence of bacteria does not at all exclude the possibility of trichomonad infection. It has been shown that the *Trichomonas foetus* is capable of penetrating the uterine seal and carrying *B. coli* with it.

Before commencing treatment, breeding operations should be stopped and the extent of infection ascertained as far as possible. Separation of healthy from affected animals is not necessary. Various agents are used for the destruction of the protozoon in the genital tract of the female. The following have been found effective—a solution of iodine varying in strength between 1 in 100 and 1 in 800 (the stronger solution being used in pyometra), 3 to 5 per cent. solution of lactic acid, 1 in 1,000 solution of metaphen, 1 in 3,000 solution of entozon. Using the technique of Nielsen, these are injected into the uterus on two or three occasions at intervals of a week. Swangard,[7] who published an excellent article on this disease in the *Veterinary Journal* last December, uses but one injection of iodine at a strength of 1 in 100 but for three or four days prior and subsequent to douching he has the vagina flushed out with a two per cent. solution of sodium biborate. Enucleation of the corpus luteum should be practised at the beginning of treatment but, if its expression presents difficulties, massage of the ovary may help to bring about or facilitate its extrusion later. At the next oestrus the discharge should be examined for the presence of trichomonads. Success is claimed in 70 to 80 per cent. of cases.

Cows that abort early may recover spontaneously if given a period of sexual rest for three or four months.

Swangard,[8] Dickmans and Poelma[9] claim to have cured bulls by thorough application to the penis and mucous membrane of the prepuce of 0·5 per cent. trypaflavine salve and injection into the urethra of 1 to 3 ounces of 0·1 per cent. trypaflavine solution. This is carried out under the influence of epidural anaesthesia and repeated in ten days. For purposes of control, the herd should be divided into three groups—Group A, maiden heifers and unexposed cows; Group B, pregnant cows; and Group C, infected or suspected cows or heifers and bulls. A young healthy bull should be provided for the service of Group A. It is unwise to use for the service of healthy cattle a bull that has been affected, even after treatment. Group B should be examined carefully on at least two occasions and any found healthy or that calve normally may be included with Group A. Group C may be treated but after each service the sheath of the bull should be thoroughly flushed out with a suitable antiseptic. New purchases, even of heifers, should be avoided unless from known healthy stock. Cows should not be sent out nor should neighbouring cows be accepted for service. For information on sterility in bulls I would refer you to the

address of Professor Nils Lagerlöf[10] at the Congress at Scarborough.

In this connection I would like to remind you that young bulls, especially those prepared for show purposes, often show a complete lack of sexual desire when first introduced into a herd. It must not be concluded that such bulls are sterile. This apathy is usually a temporary condition resulting from overfeeding and lack of exercise or it may be psychological and due to nervousness in unaccustomed surroundings. A run at grass for gradually lengthening periods in company with cows and heifers will generally in the course of some weeks bring about resuscitation of the dormant instincts. If after five or six weeks there is still an absence of sexual desire one may give a course of yohimbine or anterior pituitary extract.

Abortus infection as a cause of infertility in the bull must not be overlooked.

Sterility is a cause of great financial loss to the farmer, not only on account of loss of calves but also because of diminished milk yield over the extended lactation.

CONTAGIOUS ABORTION

Although two surveys disclosed that over 40 per cent. of herds were infected the Report of the Committee on Cattle Diseases shows that only three per cent. of eliminations from herds were on account of contagious abortion. This is not so surprising as it may appear, because as a rule the disease is well established before the owner is aware of its existence and by that time the facilities for isolation until reacting animals become saleable are on the vast majority of farms absent or insufficient. In addition, the fact that, in herds in which the disease has become endemic, abortions over a period of years may be few prevents the farmer from realising the great diminution in profit which its presence entails. Minett and Martin[11] have shown that the reduction in milk yield of cows that react, but have not aborted, may be as high at 20 per cent. The reduction is, of course, much greater in animals that have aborted. Apart altogether from economic considerations this disease is important from the public health point of view. According to the *British Medical Journal* (November 12th, 1938) between 400 and 500 people are affected annually in Great Britain with undulant fever either as a result of drinking infected milk or from contact with infected cattle.

A great deal of research work has been done on Bang's disease and many methods of protection against *Br. abortus* by means of dead and live vaccines have been tried. Killed vaccines do not appear to confer much resistance. The use of potent live vaccines on mature cattle, although they may protect against abortion, possesses many objectionable features. The attenuated live vaccine of McEwen[12] appears to be devoid of many of these objections and seems to be deserving of extended trial. Another method that appears to be safe, judging by reports, is that of Buck and Cotton.[13] They have been advocating for some time the inoculation of heifer calves, at between four and eight months old, with live vaccine. Unfortunately, the number of animals used in their experiments was small but the results were very promising. I shall give you the summary of the latest report of the U.S. Department of Agriculture.[14] It is as follows:—

"In the experiment carried on in 1932-34 at the experiment station, Bethesda, Md., six calves about six months of age and five yearling heifers were vaccinated against Bang's disease. When pregnant, these animals and twelve unvaccinated pregnant heifers were exposed through the conjunctiva to *Brucella abortus* or by contact with infected animals. The exposure failed to transmit Bang's disease to any of the vaccinated animals, as indicated by guinea-pig inoculation results with uterine material and colostrum at the time of calving. The five animals vaccinated during calfhood that produced vigorous calves gave negative results to the agglutination test at time of calving. On the other hand, three of the animals vaccinated when yearlings reacted in a titre of 1 : 100 and the fourth in a titre of 1 : 200 when they produced their calves.

Close contact for 24-hour periods, at different times, with five cows that had recently aborted resulted in the transmission of Bang's disease to three of seven, or 43 per cent. of the heifers used as controls. A single conjunctival injection transmitted it to four of five, or 80 per cent. of the control animals used.

The use of abortion vaccine in calves gives indication of having a distinct advantage over its use in more mature unbred heifers since in the former, the *Brucella abortus* agglutinins that are caused to appear in the blood serum by the vaccine injections disappear more promptly and more regularly."

The sixth vaccinated calf (missing from the summary) was found not to be pregnant. The report says that she may have aborted early but if so the act escaped notice and frequent tests of her blood serum always yielded negative results.

To those who have not read it the report would perhaps be more intelligible if summarised thus:—

Of six calves vaccinated—three with an attenuated and three with a virulent culture—and exposed to infection during pregnancy, five gave birth to vigorous calves. Guinea-pig inoculation results with uterine material and colostrum from these animals were negative and agglutination tests with blood serum were

also negative. The other animal was not in calf but serologically there was no evidence of abortus infection in this animal. Of the seven control animals in this group three expelled weak calves and *Br. abortus* was demonstrated in the uterus and colostrum of two of them. Another, although giving birth to a vigorous calf was proved to have both uterus and colostrum infected. The remaining three gave birth to vigorous calves.

Of five heifers vaccinated as yearlings with attenuated vaccine and exposed to infection during pregnancy, four gave birth to vigorous calves and guinea-pig inoculations indicated an absence of *Br. abortus* from their uteri and colostrum. The agglutination titre of three of these animals at the time of calving was 1 : 100 and of the fourth 1 : 200. The fifth heifer was not pregnant. She may have aborted early but, if so, the foetus was not discovered and her agglutination titre was low. Of the five controls in this group one aborted at the 220th day, one gave birth to a weak calf at the 251st day. A third was believed to have aborted because the udder had shown some enlargement, the agglutination titre was 1 : 1,000 and guinea-pigs were positive on inoculation with her milk but not with uterine secretion. Two of the controls gave birth to vigorous calves but the uterine discharge from one of these was positive.

A certain amount of criticism can be levelled at the report, particularly the late period at which animals were exposed to infection, in one case more than six months after service (the earliest being two-and-a-half months), and the fourth month of gestation seems rather late for contact exposure.

Very satisfying features, however, are the absence of reaction to the agglutination test and an absence of *Br. abortus* from the uterine discharge and colostrum in those animals vaccinated during calfhood.

Last year I was consulted about a herd in which abortion was rampant. Having made the recommendations which the circumstances demanded and acting on the findings indicated in earlier publications by Buck, Cotton and Smith, I suggested vaccination of all female calves in the herd between five and eight months' old. The suggestion was adopted and on June 20th, 1938, blood samples were taken from 16 calves and immediately after each calf was given 5 c.c. of live vaccine. The vaccine was a young culture isolated from the same herd, grown on liver agar, washed off with sterile normal saline and diluted to a density of No. 1 on the Brown scale. Blood serum from the 16 was submitted to the agglutination test at dilutions of 25, 50 and 100. Fourteen were negative at all dilutions, one was positive at a titre of 1 : 50 and one at a titre of 1 : 100.

From these animals blood serum was again submitted to the agglutination test on April 15th, 1939, but on this occasion the dilutions were 12, 24, 48 and 96. With one exception agglutination was complete or almost so at 1 : 12; two showed complete, four almost complete and four partial agglutination at 1 : 24; three showed partial at 1 : 48, no animal reacted at a higher titre. One of these calves, Calf R 15, which originally agglutinated fully at 1 : 100 now was only partial at 1 : 50, another, Calf R 12, also showed a slight fall in the titre.

The table below shows the agglutination titres on each occasion.

Table

	Age. Weeks.	Agglutination Titre Pre-inoculation, June 20th, 1938.			Agglutination Titre, April 15th, 1939.			
		1 : 25	1 : 50	1 : 100	1 : 12	1 : 24	1 : 48	1 : 96
Calf R–12 ...	57	++++	+++	—	++++	+++	+	—
„ R–13 ...	55	—	—	—	+++	+	—	—
„ R–14 ...	55	—	—	—	+++	+++	++	—
„ R–15 ...	54	++++	++++	++++	++++	++	—	—
„ R–16 ...	43	—	—	—	+++	+	—	—
„ R–17 ...	41	—	—	—	+++	—	—	—
„ R–19 ...	39	—	—	—	++++	+++	—	—
„ R–21 ...	38	—	—	—	+++	—	—	—
„ R–22 ...	27	—	—	—	+	—	—	—
„ R–23 ...	32	—	—	—	++++	++++	—	—
„ S–1 ...	25	—	—	—	+++	—	—	—
„ S–10 ...	25	—	—	—	+++	+++	+	—
„ S–11 ...	24	—	—	—	+++	—	—	—
„ S–12 ...	23	—	—	—	+++	—	—	—
„ S–13 ...	22	—	—	—	+++	—	—	—
„ S–14 ...	20	—	—	—	++++	++	—	—

These heifers are now about to go to service and the owner has agreed to allow the ten calves next in order of age to act as controls. Calves following these controls are to be vaccinated and all will be exposed to infection by contact.

Bang's disease is now so widespread and of such economic and public health importance that if an effective method of protection is not soon found we shall have to look for some chemical agent capable of destroying the organism *in vivo*.

Montgomerie[15] has shown that sulphanilamide may be effective in the treatment of guinea-pigs and goats. Even if effective the cost of treating cattle with this compound would, I fear, be prohibitive.

In the hope that sodium iodide might be as destructive of the *Br. abortus* as it is of the Actinobacillus and *Actinomycosis bovis* I injected intravenously with large doses of this agent, on March 30th last, two cows which had aborted three weeks previously. On April 20th there was no reduction in the agglutination titre of either, but even if the agent were capable of killing the organisms, the agglutinins might still persist. I do not feel, however, that treatment is going to be so simple. If neither prophylactic nor curative measures are to be effective we are left with the question of eradication. Anybody who has worked in the field can appreciate the difficulty of eradicating abortus infection from the ordinary dairy herd; indeed, on any premises where the disease is well established, unless there are facilities for complete segregation its elimination is practically impossible.

MASTITIS

Annual disposals from dairy herds because of udder disease are assessed at 7·7 per cent., while disposals on account of low yield are estimated at 17·7 per cent. From statistics collected, however, there is a justifiable presumption that many of the eliminations ostensibly necessitated by low milk yield are in fact due to disease, particularly chronic mastitis and abortus infection.

Some years ago we only troubled about two forms of mammitis, acute and tuberculous. Now we distinguish acute, subacute and chronic and, of the three forms, the last is responsible for the heaviest losses. Here I refer to the contagious form due to the *Str. agalactiae*. In some herds over 60 per cent. of the milch cows may be affected and Stableforth[16] states that at least 20 per cent. of the milch cows in England are infected with this organism.

The disease is usually introduced into a byre by a newly purchased apparently healthy animal and it may be months before any change becomes apparent in the udder tissue of the carrier. By that time others will have become infected either by the hands of the milkers or by the milking cups.

The first change noted is the appearance of floccules or clots in the fore milk but as the following milk appears normal and there is no evidence of tenderness in the gland, the milker pays no attention to the condition. Later a degree of fibrosis or lobulation is noted in the affected quarter. This gradually extends and the tissues become hard. With extension the appearance of clots in the milk becomes more frequent and they become more generally disseminated throughout the secretion which becomes watery. Eventually atrophy of the gland takes place. One or more quarters may be affected. At no time does the cow show evidence of constitutional disturbance.

Mastitis due to the *Str. agalactiae* is of importance only from the economic point of view, because there is no evidence that the organism is pathogenic to man; in fact, there is a great deal of evidence to the contrary.

The symptoms, diagnosis, and control of this and other forms of mastitis have been very ably dealt with by Stableforth[16] in a report which appeared in the *Veterinary Record* on the 15th ultimo. Chronic mastitis may also be due to staphylococci and tubercle bacilli, other strains of streptococci, etc. Subacute mastitis is usually due to Strept. Group 2 or 3 of Minett (dysagalactiae and uberis of Diernhofer). This form is not contagious and in mild cases the gland may recover its function.

Acute mastitis may be caused by Streptococci of Group A (very rarely), of Group C (Lancefield), by Staphylococci, *Corynebacterium pyogenes*, *B. coli*, or, very rarely, other organisms.

That form of acute mastitis due to staphylococcal infection is the most severe type and often results in death of the patient. It may occur at any period of the year, generally soon after parturition. In this condition the udder is acutely inflamed and usually only a small quantity of brownish or blood-stained material can be expressed from the teat. Necrosis and sloughing or even gangrene may occur. Constitutional disturbance is very marked.

Acute summer mastitis is usually due to *C. pyogenes*. There is a very thick purulent exudate and later a tendency to abscess formation. Systemic symptoms are pronounced and death occasionally occurs. In acute streptococcal mastitis the gland is also inflamed, swollen, and tense, and the secretion is a yellowish fluid containing a variable amount of clotted material.

In both acute and subacute mastitis the teat is almost invariable involved. The condition of this appendage is often a useful guide in

distinguishing clinically tuberculous mastitis from other chronic forms.

When there is severe inflammation attempts to save the affected quarter are rarely successful. General treatment as for fever should be adopted. The teat should be stripped frequently. Fomentations followed by liniments or poultices should be applied. Some practitioners inject manganese intramuscularly or parantol or iodine directly into the tissue; others have recourse to vaccines of various kinds. If staphylococci are operating a staphylococcal antitoxin might be useful. In bad cases amputation of the teat is the most effective way of ensuring drainage.

Haemolytic streptococci responsible for septic sore throat and scarlet fever in man have on a few occasions been isolated from the udders of cows.[17] It is generally accepted that infection of the cow in these cases was from a human source.

Diseases of bovine origin transmitted by milk to the consumer include tuberculosis of bovine origin, undulant fever, foot-and-mouth disease, vaccinia, gastro-enteritis (from staphylococcal infections of the udder), possibly (but very unlikely) anthrax and actinomycosis.

The various Ministries and Boards of Health in Great Britain and Ireland prohibit—by Act, Order or Regulation—the sale for human consumption of milk from any cow suffering from acute mastitis, suppuration of the udder, tuberculosis of the udder, abscess of the udder, actinomycosis of the udder, induration of the udder likely to affect the milk, enlargement of the supramammary lymphatic gland or any condition of the udder or teats likely to convey disease. Other conditions prohibiting sale are anthrax, foot-and-mouth disease, acute septicaemia, any comatose condition, retained placenta, any septic condition of the uterus and tuberculosis in any form that can be recognised clinically.

Suppuration and abscess formation, including furunculosis, do not call for much comment beyond remarking that furunculosis[17] may be contagious and at times rather acute.

Induration is often a perplexing problem to the veterinarian engaged in public health work and a few words on this subject may not be out of place.

The time to make a clinical examination is when the udder is empty. At no other time can slight abnormalities be detected. One should note the symmetry of the quarters. Then palpate the whole surface with the finger tips for evidence of fibrosis in the glands or changes in the integument. Feel the teat duct and note if it is thickened. Using both hands raise corresponding quarters and note their relative size and consistency around the lactiferous sinus. Lobulation may be noted by taking each quarter between the two hands and moving it backwards and forwards under fairly firm compression. Extend the examination upwards, paying particular attention to the posterior border of the hind quarters. Lastly palpate, if possible, the supramammary lymph glands but do not forget that this gland is not necessarily enlarged in tuberculous mastitis. (Udall's[19] procedure in physical examination of the udder is well described in the report of his address at the Glasgow Veterinary Congress.)

The texture of the mammary gland varies in different animals, even in those of milking strains. Some are soft and pliant, others firm and tough. In these firm, leathery udders induration is not so readily identified.

In chronic interstitial mastitis, following upon an acute attack there is diffuse hardening of the affected quarter. At first there is enlargement but later a decrease in size. The milk supply is depressed. Abscess formation may be noted. Thickening of the teat duct is usual. In other forms of chronic mastitis the discharge is yellowish-white, lumpy or purulent. The base of the teat is first involved and hardening extends upwards. The teat duct may be thickened.

In tuberculous mastitis a hind quarter is more commonly involved than a fore and the disease process usually begins fairly high up in the gland. One or more quarters may be involved. At first the condition is difficult to recognise but when it becomes apparent on palpation the part feels hard, nodular or lobulated. There is no evidence of tenderness. Induration gradually extends and, accompanying it, in contradistinction to what occurs in other forms of chronic mastitis, there is progressive enlargement of the part. After a period, covering perhaps several months, the whole quarter becomes invaded. The supramammary lymph gland may or may not be enlarged. At first there is no apparent alteration in the quantity or quality of the milk. After a time it becomes thin, watery and reduced in quantity; later a watery greenish-yellow fluid, containing flakes and debris which sink to the bottom of the container on standing. When the condition is very advanced only a small quantity of watery turbid fluid is obtained from the affected gland.

It is well to note that tuberculous mastitis may rarely assume a rather acute form.

TUBERCULOSIS

The percentage of cows affected with tuberculosis in Great Britain is generally taken at between 35 and 40. In this country it is probably lower. The following figures were kindly supplied to me by Mr. Dolan, Chief Veterinary Officer of the Dublin Corporation, two years

ago. They are in respect of the cows slaughtered at Dublin Abattoir during a previous five-year period:—

Cows slaughtered 27,708; affected 8,962; percentage affected 32·34. Of the diseased animals 210 showed tuberculous mastitis, representing 0·75 per cent. of the total, or 2·3 per cent. of the affected.

In the previous quinquennial period the figures were: Cows slaughtered, 27,719; affected 7,857; percentage affected 28·9. Inspection in the Dublin Abattoir is very carefully carried out and I am sure that but few which would have reacted to the tuberculin test escaped detection. Many of these cows come from provincial areas but I think we can safely assume that most of those from the country come from dairying districts because in dry farming areas heifers and cows, when not sold in-calf, usually die on the farm from accident or some affection of a non-contagious nature.

We must consider tuberculosis from the public health, the animal health and the economic standpoints.

Infants and children, who are the greatest consumers of milk, appear to be more susceptible to the bovine type of tubercle bacillus than those of more mature years. In England and Wales, up to 1931, Griffith found that in children between birth and five years of age the bovine type was responsible for 84 per cent. cervical gland, 82 per cent. primary alimentary, 33 per cent. meningeal and 29 per cent. bone and joint cases of tuberculosis, and that the proportion became much lower as age increased. Miller,[20] in Edinburgh, has put the cervical gland figure as high as 90 per cent. Six per cent. of all deaths from *M. tuberculosis* in Great Britain are attributed to the bovine type and this organism, contrary to previous experience, has been isolated alone from some cases of pulmonary tuberculosis in humans. In the United States of America cervical and mesenteric glandular tuberculosis has become comparatively uncommon in those States from which bovine tuberculosis was eradicated.

Among cattle the disease seems to spread with even greater rapidity than among humans. Following infection progressive invasion is the rule with consequent reduction in the animal's vitality and functions and eventually wasting. Hence there is decrease in milk yield, increased susceptibility to other affections and increased maintenance costs.

To this weight on the debit side must be added depreciation in value. Ordinary dairy cows bought subject to the tuberculin test cost from £2 to £3 per head more than those purchased without such a contingency, while the depreciation in pedigree animals which react to the tuberculin test may be enormous.

Regarding tuberculin, I have often noticed that different brands of intradermal tuberculin produce swellings of different type and size in the skin of non-reactors. As all veterinary surgeons do not use the same product, this is likely to lead to confusion. In any scheme of eradication it is important that a reliable material be used and one which gives a minimum of doubtful reactions.

The problem of eradication is a difficult one but with good will and energy much can be accomplished. This was shown by Jordan[21] and later by Edwards[22] working on thirty farms covering an area of nine square miles in Ayrshire.

The cattle on these farms were tested in the late winter of 1929 and re-tested every six months up to the winter of 1932. At the initial test eight herds were found to be tubercle free. At the final test at the end of three years 17 were tubercle free and in the 25 herds which showed most improvement the percentage of reactors was reduced from 20·1 to 6·6. Although testing was discontinued at this stage progress was maintained so that two years later, in the group of 25 farms on which the movement got support, 17 were tubercle free and the incidence in the group was reduced to 1·1 per cent. The five other farms did not show the same progress. On three of them there was improvement at the end of 1932 but on the other two, on which the owners were unable or unwilling to co-operate, the proportion of affected increased in one case from 47·1 to 61·7 and in the other from 36·9 to 54·7 per cent. These increases seem large considering the likelihood that the owners would have made some attempt to emulate their neighbours.

Another feature worthy of note in connection with this experiment is that the number of cattle on the 25 farms increased by 14 per cent. in the five-year period, while on the five farms on which the proprietors were apathetic or labouring under disadvantages, there was a decrease of 1 per cent. in the same time.

Before any scheme of eradication on a wide scale could be undertaken it would be necessary to have reservoirs for the replenishment of dairy herds. Such sources of supply could be provided by dry-farming areas and breeding districts where experience and surveys show that the incidence of tuberculosis is low.[23] Montgomerie and Rowlands[24] practically succeeded in eliminating the disease from such a district in North Wales in less than two years.

Extracts from the summary of their report read:—

"In December, 1935, the incidence of reaction was 4·9 per cent. among 470 animals on 30 farms, whereas in October, 1937, it was 0·52 per cent. among 572 animals on 39 farms. The three reactors detected on the occasion of the

latter general test were all recently purchased animals.

"The demand for clean cattle from the district exceeded the supply and 193 head were sold during approximately two years. Since the prices obtained were £3 to £5 in excess of their local market value, the area benefited to the extent of £750."

A satisfactory method of vaccination would be the cheapest way of controlling bovine tuberculosis.

In coping with this and the other diseases mentioned, care, energy and complete co-operation between the owner and the veterinary surgeon are essential.

This address can claim no merit other than that it presents plenty of material for discussion. I have had to put it together hurriedly and I am sure you will appreciate the difficulty of condensing so many and such extensive subjects within the allotted space. In attempting to do so I have dealt with them chiefly from the economic and practical aspects.

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Discussion

The discussion was opened by Mr. H. G. Lamont, M.Sc., M.R.C.V.S., Head of the Veterinary Research Division, Stormont, in the following terms: I should like to say at the outset that I appreciate very much the honour of being asked to open the discussion on Professor O'Dea's paper, although I do regret that Mr. Shanks, the Secretary of the North of Ireland Division,* was unable to secure the services of a practitioner for this purpose.

It is a paper that will appeal to everyone, but particularly to practitioners, and I tender my respectful congratulations to Professor O'Dea not only on the subject matter, but on the interesting and readable way he has set it out. Although working in a laboratory, I do come in contact with cattle practice to a considerable extent, and those of you who are interested in Shorthorns will be aware of the fact that my native town of Cookstown was, and I believe still is, the centre of Shorthorn breeding in this island. Having said this I still am diffident about my ability to do justice to this excellent paper.

Professor O'Dea opens his paper with a useful summary of the sterility problem. This is a problem of particular interest to Irish practitioners. I am not sure what rôle the Trichomonas parasite plays in this problem, whether it causes disease *per se* or in symbiosis with certain bacteria or, as has been suggested—I do not recollect by whom—that it is a harmless commensal. At any rate our own opinion is that it is associated with sterility and our experience is that one is fairly safe in diagnosing this infection from the clinical history. The history of the first outbreak confirmed in this country is as follows.

I was consulted about an epidemic of sterility in a district which followed the introduction of a new bull. Important details of the symptoms were, firstly, returning to service at irregular periods, *e.g.*, three and four months after service. In some instances animals did not manifest oestrus but failed to have a calf. A discharge was often noticed from these animals. The appearance of the discharge varied: from

*While Professor O'Dea's paper was presented at a meeting of the V.M.A. of Ireland, members of the North of Ireland Division were present by invitation.

animals believed to be in calf it was like skim milk of a slightly brownish tinge as if the milk had soured slightly; in others it was noticed two and three days after service and was glairy with yellow floccules, and in yet others it was thick and viscous and very catarrhal. One observant owner had noticed from two animals small mouse-like embryos almost dead white in colour. From the clinical history of irregular heat periods and discharges trichomonas infection was suspected and I arranged with the owner of a cow which should have been near calving but was ejecting a milk-like fluid, to slaughter the cow and bring the uterus immediately to the laboratory. The uterus was found to contain about one gallon of a milky-looking fluid and floating in the contents was a small mouse-like embryo which the owner reckoned was seven months old. My colleague, Mr. Kerr, prepared a slide from the uterine contents and needless to say we were highly gratified to find our suspicions confirmed. Kerr later visited the district and found trichomonas infection present on all the farms that had used the bull, and not only that, he visited the farm where the bull came from and found the disease rampant there too. He examined the bull and had no difficulty in finding trichomonas on the penis, but did not observe any macroscopic lesions or evidence of clinical disease—observations which were confirmed when the bull was slaughtered.

Since that date we have come in contact with many cases of this disease. We find that if one cannot detect the parasite on direct examination of the discharge, particularly of the glairy mucoid type of discharge, it is good policy to shake the discharge up with saline or trypsin broth, incubate for several hours, centrifuge and then examine. Kerr has confirmed the presence of the infection in this manner several times where I failed to find it at the farms. He has also cultivated the parasite and has brought a culture in case anyone would like to see the parasite.

We get very good results with the ordinary Nielsen operation, using either a 1 in 200 or 1 in 400 aqueous solution of iodine. We carry a stock solution of 1 in 10 iodine and a 40 oz. measure. This is filled with boiled water which has cooled to milk heat and 1 oz. or 2 oz. of the 1 in 10 stock solution added. The uterus is pumped full of this solution; 300 c.c. is an average quantity for a Shorthorn cow. The os is irrigated very particularly and using the forearm as a vaginal plug, the vaginal cavity is filled and the iodine applied with the hand by splashing to the roof, side and floor.

In examining the uterus and ovaries *per rectum*, I find it helps first to locate the os. In my early days I put my left hand in the vagina and held the os and then located it *per rectum*. One can then move forward on the body of the uterus until one feels the bifurcation distinctly. About two or three inches on either side of this one can feel the ovaries. It may take a little exploration to locate them, but really it is easily done.

As regards sterility in heifers, one quickly discovers that one can seldom carry out a Nielsen operation owing to lack of room. I apply the following routine treatment in heifers unless the cause of the sterility is an obviously structural defect. Wash out every other day with a 1 in 400 solution of iodine in water for three weeks, miss one heat and on the day of service, wash out the vagina thoroughly with an aqueous solution of sodium bicarbonate made by dissolving one teaspoonful of the soda in each pint of water (the water should be boiled and allowed to cool to milk heat). Considerable success has followed this treatment. In many valuable Shorthorn cows, where the cause of the sterility was not apparent, I have combined the use of prolan with the Nielsen operation. I readily admit that the treatment is empirical, but the results are good.

It is just as well to note that a number of animals with trichomonas infection do appear to recover naturally, with the passage of time, especially when the owner refrains from sending them for service.

When on this question of sterility I had hoped that Professor O'Dea would have made some reference to retained placenta and its treatment. Mr. W. S. Lamont, Cookstown, would never allow me to remove a placenta until it was ready to come, even though it meant waiting nine days, and I do not recollect that he ever lost a cow from metritis. On several occasions lately I have used a pituitary extract and, while I am not prepared to rule out coincidence, the animals have cleansed without manual interference within twelve hours. Perhaps Professor O'Dea could give some information on this subject.

I do not think one is likely to confuse coital exanthema with trichomonas infection. I can recall vividly the first occasion that I saw "bull burn," as it is called locally in Tyrone: the animals were so obviously in pain and the evidence of local irritation quite obvious. At that time W. S. Lamont favoured the use of either biniodide of mercury or perchloride of mercury for irrigating these cases and the results were quite good.

We have not used oestradiol benzoate for inducing oestrus in cows, but this preparation has been used successfully by us in sows. The particular preparation which we have used is known as di-menformon.

I am omitting any reference to contagious abortion beyond stating that if a chemical agent capable of destroying the germ *in vivo* could be found one would not trouble to look for a means of protection. In some unpublished experiments

we did not find sulphanilamide effective in the treatment of abortion infection in an experiment embracing 36 guinea-pigs. The guinea-pigs were fed with 1 gramme sulphanilamide per day for one week. They were then infected and dosage continued for a further 14 days. They were killed in one month and no difference in the degree of infection was noticed as compared with controls.

I think most practitioners would breathe a sigh of relief if they could obtain a reliable treatment for mastitis. I put it forward, as a suggestion, that one might try "693" in this disease. We have found "693" remarkably effective in certain conditions. This preparation will probably in due course become very much cheaper, as has sulphanilamide.

In chronic streptococcal mastitis we have had good results with the irrigation treatment using entozon or acriflavine. In one herd last year where considerable trouble was being experienced in dry cows, particularly when they were springing, infusion of the udder with entozon gave most encouraging results. Out of 16 cows untreated, eight developed mastitis when springing, and out of 18 treated cows two developed mastitis. The procedure was to treat the udders when dry. At first we infused them by gravity, but later we hastened the process with air pressure from an enema syringe. Entozon 1 : 1,000 was used and the solution was left in the udder until the next day, when the udder was milked out. It was generally drawn for two or three days when the teats were sealed with iodoform collodion. Quite often after the infusion treatment, a yellow serous-like fluid was drawn from the udder for two or three days. This, however, usually disappeared and the udders were normal at the next lactation.

Professor O'Dea has referred to staphylococcal mastitis. We have been endeavouring to free a herd from mastitis infection and it has occurred to me that the results may be interesting to you. There were 91 cows in the herd when the first examinations were made and eight cows have since been disposed of. Samples were collected and examined culturally from each quarter.

The following table summarises the position:—

12* cows had streptococci present before treatment.
79* cows had staphylococci present before treatment.
5 cows had streptococci present after treatment.
30 cows had staphylococci present after treatment.

The treatment used was irrigation of the udder with 1 : 10,000 acriflavine solution. It will be noted that the treatment reduced the number of cows harbouring streptococci in their udders from twelve to five and those harbouring staphylococci from 79 to 30. (The eight cows sold were not included in these figures.) The significance of the presence of the staphylococci is not apparent, but they do not appear to be causing any trouble clinically. We were certainly surprised to find staphylococci present in so many samples.

*Of these cows eleven had both streptococci and staphylococci present.

In Northern Ireland we have very serious trouble from *Corynebacterium pyogenes* as a cause of mastitis: we have encountered this organism not only in the summer season but at other seasons. Occasionally this infection has taken the form of an epidemic in a district. It is a condition that one would like to know more about. There must be a great number of cows which have lost a quarter as the result of this particular infection. I wonder if there is any connection between "mastitis" years and sterility years.

As the paper deals with disease of dairy cattle, some remarks on calf pneumonia may not be out of place. Periodically we are consulted about deaths in calves particularly from about two weeks to nine weeks of age. The chief symptoms noted are sneezing, coughing, and catarrhal nasal discharge. In some calves no other symptoms are noticed. Scour may or may not be present. Others, unfortunately, develop a fatal type of pneumonia and in some outbreaks the mortality has approximated to 100 per cent. The history and symptoms of these outbreaks struck us as being not unlike the history of piglet influenza. In certain animals slaughtered before death no organism was grown although very extensive lesions of pneumonia were present. We know now, though, that our technique for growing influenza bacilli was faulty and even yet we have the greatest difficulty in securing cultures and of propagating them.

Kerr and I have transmitted the disease to three healthy calves by putting them into contact with affected calves. We have also transmitted the disease by emulsifying the consolidated lung with sand and saline, filtering through fine muslin, and injecting the filtrate intranasally into a healthy calf. From that calf we have transmitted the disease through six generations. These observations, of course, are of a preliminary nature. We have succeeded in setting up a typical pneumonia with a Berkefeld filtrate plus a culture of an organism of the influenza type isolated from the lungs of an affected calf. At *post-mortem* examination 14 days later typical lesions were found but we failed to obtain any organism on cultural examination. A second calf was inoculated intranasally with lung emulsion from this calf, the material being filtered through a Seitz filter. The results again were positive, small definite lesions being obtained. A third calf was inoculated with Seitz filtrate prepared from the lung of this calf, again with

positive results, lesions indistinguishable from those of a natural case resulting.

The fact that we failed to recover cultures of the influenza bacillus puzzled us at first even though we were using the recommended cooked blood agar. As a matter of fact my colleague Shanks has had the same difficulty with pigs although in both instances we could see slender, Gram-negative, slightly curved bacilli in slides from affected lungs. Our opinion is that this organism is more difficult to cultivate than the text-books would have us believe.

Unfortunately we have been unable to take our experiments further at the moment and these results are given in the hope that other workers better placed as regards staff and finance will investigate this calf influenzal pneumonia. We incline to the view that this calf pneumonia is a specific infectious disease caused by a virus and that secondary organisms, principally an organism of the influenza type, play an important part in the development of the lesions.

Mr. W. R. Kerr expressed warm appreciation of Professor O'Dea's paper, observing that its subject was "good food and worthy of considered digestion at a meeting such as this."

He would like from their own experience to raise a few points in its discussion, some perhaps upon which he did not entirely agree and others which he thought might be further emphasised.

High production in dairy cows was accused by the essayist of being the cause of eliminations; his own experience of an experimental Friesian herd maintained and fed for high milk production was an agreeable one. The herd average was 1,300 gallons and most of the cows had been five years in production at that time. Their health was excellent and a minimum of disease was found. Milk fever and mastitis were rare. Possibly high production led to errors in dietetics—a more probable source of trouble.

The figures of sterility, 23·8 per cent., and abortion 3 per cent., were surely elastic. They must vary greatly in districts and countries and were also controlled by systems. In Northern Ireland the use of the communal bull in an area of small farms lent itself to the contagious types of sterility. Flying herds systems as opposed to self-contained systems would increase the abortion figure.

He desired to make a few remarks about trichomonad sterility as they in the North were carrying out experimental work on heifers, using a pure culture of the organism which they had isolated; also they had diagnosed a large number of outbreaks of this disease. The difficulty of diagnosing the disease by smear examination was a very real one, due to the small percentage of actually infected animals which possessed the parasite free in sufficient numbers to be visible. The exudate in a cow with pyometra and a "skim milk" discharge might contain anything up to 5,000,000 parasites per c.c. In their experience, however, these cases were rare: a viscid whitish discharge varying in quantity was the usual manifestation, and the parasites in this type of exudate were few in number and "lazy," thus making them much more difficult to detect. A cow just infected might show the parasites for two or three weeks; then they disappeared; in others they might not make an appearance until the cow returned to service; others, again, did not show them at all, yet were sterile. The presence of *Trichomonas foetus* in any one animal coupled with a history of cows returning might be regarded as sufficient evidence of this disease. He deemed that to be of great importance.

A typical symptom exhibited was that a definite vaginitis was present in all early cases, but their experience had been that it was very difficult to demonstrate the parasite from this lesion. It was quite possible that this was actually a secondary manifestation and should not be confused with granular vaginitis. Another point—the parasite was much more resistant to room temperature than was usually believed, remaining visible in discharge for several days. A little saline at 37° C. added to the discharge, which was shaken up, was usually sufficient to liven them up.

Mr. Lamont had mentioned their experience in the treatment of cows and the success attending these efforts, but he was very pessimistic about the bull. They had found the parasites far up the urethra and he could not visualise present treatments being of any use. A natural recovery might result from a prolonged rest without treatment. They hoped that at a later date when their experiments were completed they might be able to add further data relevant to this disease.

With regard to the abortion experiment carried out on calves in U.S.A., he agreed with Professor O'Dea that criticism might be levelled at the experiment. The most important point that struck him was that, of the seven controls, actually none of them aborted in the true sense of the word. It was apparent that it was unfortunate that the more customary virulent strain experienced was not used.

The reactions of the five vaccinated heifers were 1/100 and 1/200. This was open to criticism. The results of their experiments in the North on the agglutination titre of cows infected with *Br. abortus* were contrary to the interpretation of this titre. In their experience uterine discharges from infected cows were 100 per cent. positive—only one of the five controls showed a positive uterine discharge.

The table presented by Professor O'Dea illustrating the titres of six- to twelve-month-old calves prior to inoculation was most interesting. R.15 and R.12 showed a definite falling off of their titre even after an injection with a virulent strain. The demonstration of a general residual titre ten months after their injection might partly explain the residual reaction of 1/12 or 1/24 by many cows in dairy herds, although there was no direct evidence of abortions in the herd.

He also agreed with Professor O'Dea that the future solution of the *Br. abortus* problem would lie in the use of some chemical agent capable of destroying the organism *in vivo*.

Professor W. Kearney complimented Professor O'Dea on compiling so concisely and yet so fully and explicitly such an instructive paper at short notice. He had condensed for them a fund of information which would take a considerable time to collect otherwise; consequently his paper would be of great value for reference when published.

There were a few observations which he (Professor Kearney) would like to make on the subject matter of the paper. The first was in connection with brucella infection as a cause of sterility in cows. While many members of the veterinary profession maintained that abortion disease does not lead to sterility, there was an overwhelming amount of evidence from farmers

that outbreaks of contagious abortion are usually followed by sterility of a temporary and sometimes of a permanent kind. In this respect he cited a case of a large dairy herd in which sterility was unknown until the herd had been inoculated with live abortion vaccine, following the occurrence of a few cases of contagious abortion. Since the vaccination, sterility had become common in the herd. Most of the vaccinated cows became affected for variable periods and some appeared to be permanently infertile. Repeated examination for trichomonads and causes other than the brucella infection gave negative results, and he felt satisfied that the vaccine was responsible for the sterility in this herd.

In regard to so-called summer mastitis due to *C. pyogenes* infection, there was some evidence to indicate that this organism is capable of prolonged existence outside the animal body, and if this were the case it would explain the recurrence of the disease in certain fields or paddocks, year after year. He was told by an observant farmer recently that this form of mastitis occurred only when his cows were put into a certain field in his farm.

Much stress was being laid nowadays on the importance of hygiene as a means of preventing infectious diseases and while not wishing to minimise the value of this branch of preventive medicine, they must not lose sight of the necessity for specific methods of controlling and preventing disease by other means. The pendulum must not be allowed to swing so far towards reliance on hygiene and dietetics that proved bacteriological methods may recede to a dangerous degree.

In welcoming their colleagues from Belfast, Professor Kearney made reference to the outstanding work which Mr. Lamont and his staff had performed in recent years. He was very interested in their new discovery of a filter-passing virus in infectious pneumonia of calves —a finding which (he observed) is supported by the epizoötiological characters of that prevalent disease.

Professor T. G. Browne, on being called upon by the Chairman to speak, also complimented Professor O'Dea on his paper and said that although the subjects dealt with were for the most part outside his line of work a few points had arisen in the discussion upon which he would like to make a few observations. In the table which Professor O'Dea had given them showing the causes of disposal of dairy cows from herds it appeared remarkable that udder disease was responsible for only 7·7 per cent. of animals having been eliminated from herds. This would appear not to agree with their experience in that country where udder disease was the bugbear of the dairy farmer. However, those figures had been compiled from a very large number of herds in Great Britain by the Agricultural Research Council.

Another matter which had been raised was the relationship of sterility to contagious abortion. This was an old question and one about which there was considerable divergence of opinion. One would be inclined to believe that metritis would frequently result from retention of the foetal membranes which often occurred in abortion cases and that this metritis would result in sterility, either temporary or permanent. Many well-known authorities, however, were strongly of the opinion that sterility is not any more prevalent in abortion-infected herds than in abortion-free herds, but figures had been recorded by different workers from time to time which would appear to support both views.

Regarding the suggestion that vaccination of abortion-infected herds may cause sterility, it was difficult to believe that vaccination could possibly make conditions any worse so far as sterility was concerned, seeing that the herds had already been infected with the same organism as that in the vaccine.

The Reply

Professor O'Dea, in replying, said that he would like to associate himself with the hearty welcome extended by the President and other members to their colleagues from Northern Ireland. As Mr. Magee had said, they always brought new and valuable information with them, but their welcome was actuated not so much by that fact as by a feeling of good fellowship. These joint meetings were always a source of pleasure and profit. (Hear, hear.)

In opening the discussion, Mr. Lamont had paid what he feared was an undeserved tribute to his address and very kindly abstained from criticising its defects. Instead he had given them the benefit of his own experience and research work. The evidence he had adduced in support of his theory that a virus is the causal factor in infectious pneumonia of calves was very interesting. The disappointing results which sometimes followed the use of vaccines as prophylactic agents against this disease were probably due to our lack of knowledge regarding its aetiology and complications. He was glad to hear Mr. Lamont express the view that manual removal of the placenta is not good practice. It was a view that he had held since his early days in practice and he was of opinion that, because of early closure of the cervix following complete removal, more infection and sterility results from the fragments torn off cotyledons beyond one's reach than from the retention of the whole. Only when a cow had ceased to feed and ruminate did he interfere manually and then he detached the membranes only from those cotyledons that were within reach, twisted and withdrew the placenta sufficiently to exert tension on the walls of the uterus, cut off the hanging mass at the level of the hocks, inserted two pessaries and gave the animal a saline drench containing half an ounce of liquid extract of ergot. Within 24 hours the mass invariably came away and further interference was never necessary. He hoped Mr. Lamont's suggestion regarding the use of posterior pituitary extract or di-menformon would save practitioners many hours of disagreeable work. He feared that the present cost of M & B 693 rendered its administration to the average dairy cow uneconomic.

Mr. Kerr's experience with Professor Boutflour lent support to the view that dietary does play a part in the incidence not only of metabolic disturbances but even of those infectious diseases which are not of a virulent or acute nature. The low morbidity rate quoted by Mr. Kerr was especially to be wondered at in view of the very high yield of these cows.

Professor Kearney had warned them that in their concentration on hygiene and dietetics they must not lose sight of the causal factor without which contagious disease cannot exist. He appreciated the point, but believed that the resistance of the cow to many subacute and chronic infections would be considerably increased if all its requirements for maintenance and production were fed in optimum proportions and optimum amounts. Professor Kearney's

(*Concluded at foot of column* 1, *page* 1394)

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November 25th, 1939.

Losses Due to Disease in Dairy Herds

THE report of the joint meeting held in May of this year of the Veterinary Medical Association of Ireland and the North of Ireland Veterinary Medical Association published elsewhere in this issue contains an interesting account of several important problems of current veterinary interest. The paper presented by Professor O'Dea provided the theme for discussion and gave an interesting review of modern developments in connection with our knowledge of several bovine diseases which are responsible for wastage in dairy herds, their diagnosis and control. Sterility, contagious abortion, mastitis and tuberculosis received particular attention. It is a remarkable fact that among the affections which are responsible for "eliminations" sterility stands at the head of the list. Perhaps that is not so surprising, however, when one realises that to the dairy farmer milk production is his chief consideration and delay in conception interferes with the rapid succession of lactation periods, so much so that the cow may become an unprofitable animal and its sale attended with marked depreciation in value.

The losses from this cause are proportional to the number of animals affected and in this country sometimes sterility appears in what seem to be outbreaks. In a large proportion of herds when that occurs the regularity of oestrus is not interfered with and vaginitis is the common lesion found.

Professor O'Dea directed particular attention to trichomonas infection as a cause of sterility, but it must be confessed that the published evidence has not yielded sufficient indication as to its prevalence, although it has been recorded as occurring in England and in Northern Ireland. The exact rôle of the trichomonad in genital disease has yet to be definitely settled although investigations so far recorded emphasise the close association of these protozoa with a definite train of symptoms and lesions and their absence in normal animals; furthermore, that in a few cases the affection can be experimentally set up. Mr. Lamont in the discussion remarked that he was not sure whether the trichomonads caused disease *per se* or in symbiosis with certain bacteria or were harmless commensals. At the present time it is not advisable to diagnose trichomonas infection in an outbreak unless the organism has been definitely recognised in preparations from the discharges, etc., even although the ascertained facts seem to simulate those which are commonly seen in this condition. It is no doubt often the case that the discovery of the organism is not easy because suitable material may not be available.

The relationship of contagious abortion and abortion vaccine to sterility was also the subject of controversy, but the observations made were more general than specific. It is not improbable that the differences of view were concerned with some complicating factors which were not ascertained.

With regard to contagious abortion which was chiefly considered from the point of view of vaccination, no one will disagree with the contention that if some agent can be found which will free the living bovine animal of brucella infection the solution of the problem of contagious abortion would be within sight.

Mr. Lamont made a useful contribution when he described his experiments in connection with a contagious form of pneumonia in calves in Northern Ireland which he found to be similar to influenza and caused by a virus in conjunction with a haemophilic organism and for

(*Concluded at foot of column* 1, *page* 1395)

account of *Br. abortus* infection as a cause of sterility was worthy of note. Experiences seemed to differ somewhat: some observers recorded a high percentage of sterility while others stated that fertility is not appreciably decreased by infection with Bang's bacillus. Probably it depended on the number of cases in which endometritis supervened. Then, too, there were many herds in which the reproduction rate was very low although this disease was absent. Professor Browne had raised the important question whether resistance was likely to persist in those animals which became negative to the agglutination test following calfhood vaccination. Buck, Cotton and Smith formed this opinion as a result of some experiments carried out by them. He was not aware of any work that had been done on similar lines in these countries but he thought the experiments were worthy of further trial.

Mr. Magee, as usual, had given a practical demonstration: he always came armed with specimens and reports of interesting cases. If other practitioners would produce similar records it would enliven the proceedings at their meetings.

Mr. Harnett had quoted Sweden as an example of what could be done towards the eradication of Bang's disease. He doubted whether a reduction of its incidence could be brought about so easily in this country. In his opinion the eradication of tuberculosis could be accomplished much more readily.

CLINICAL COMMUNICATION

Long Standing Rupture of the Diaphragm in the Horse

R. MILLAR, M.R.C.V.S.
Bishop's Stortford, Herts

Subject.—Nineteen-year-old bay cart gelding, approximately 12½ cwt. in weight.

History.—In July, 1938, the animal was noticed to exhibit signs of respiratory distress when at heavy work, but was able to do light work satisfactorily. There was no history of any injury prior to this date. I did not see the horse on this occasion, but was first called to see him on August 2nd, 1939, when he was reported to be suffering from a "chill."

Symptoms.—These were as follows: temperature 103°, pulse 28, poor appetite, slight nasal catarrh, bad cough, injected mucous membranes, some respiratory distress. Auscultation of the chest revealed a full heart beat and exaggerated respiratory sounds. On subsequent visits the general condition of the animal seemed improved but recovery was very slow. In addition to the above-mentioned symptoms the horse now appeared very sluggish and disinclined to move. There was slight oedema of the dependant parts. Further auscultation of the chest revealed the same full heart beat and, although the area of the lungs in the region of the heart was clear, no definite sounds could be heard in the region of the diaphragm. On observation of the flank a double expiratory movement could sometimes be detected.

The horse was of no great economic value and recovery was slow and uneventful, apart from the points mentioned above. I saw him for the last time on August 15th, although he was still not completely fit for work.

The following points were supplied by the owner after the conclusion of the case: the horse continued to improve but was not put to work because there was no suitable work for him to do. On October 7th, he was worked with a light load, and the horseman reported that "he threw a fainting fit, broke out into a sweat and nearly dropped." He rapidly recovered and was brought back to the stable where he remained until October 14th. On this date he was given an early feed and turned out. An hour or two later he was seen to wander back to the stable and the horseman gave him another feed. On returning an hour later he found the animal dead.

Post-mortem Examination.—This revealed a rupture of the diaphragm. The whole of the right lateral lobe of the liver had passed through a tear in the tendinous portion of the diaphragm which had become completely adherent to its edge; it was a union of some long standing. Immediately below, and slightly to the right of this rupture there was a circular hole, approximately seven inches in diameter, extending from within an inch of the original tear to the junction of the tendinous and muscular portions. A loop of the large colon had passed through this second rupture. There were no adhesions between the colon and the diaphragm, and it was obvious from the nature of the edges that the tear was recent.

It is possible that the actual cause of the second rupture, which presumably led to the death of the animal, was the extra pressure of the colon on that portion of the diaphragm already weakened by the orginal rupture, as a result of the additional meal given to the animal immediately prior to its death. No other obvious *post-mortem* lesions were noticed.

Conclusions.—The interesting features of this case, as they appeared to me, were: (1) that a horse could live for such a time, without any apparent discomfort apart from inability to do heavy work, following a rupture of the diaphragm; (2) that more of the intestinal contents did not pass through into the chest at the time of the original rupture; (3) that no history of injury could be associated with the original rupture and that no subsequent symptoms were observed, and (4) that the horse could suffer from an illness between the time of the original rupture and the second rupture without fatal results.

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which useful results were obtained by treatment with M & B 693.

Altogether the meeting was one worthy of the occasion. We congratulate our colleagues in Ireland on its success and we trust that these joint meetings will continue to flourish and maintain the professional contacts between North and South.

EYE OINTMENT FOR GAS BURNS

An ointment made to the following formula is suggested by R. L. Rea (*Brit. Med. J.* 1939, ii, 881) in the treatment of eye burns due to war gas:—

A	Sodium bicarbonate	...	...	3
	Distilled water	...	...	10
	Anhydrous wool fat	...	...	10
	White soft paraffin	...	to	100

Label: Alkaline eye salve for gas poisoning. First 24 hours.

B	Boric acid ointment	...	... 10

Label: Ophthalmic ointment. Second 24 hours. The ointment is placed on the lower lid of the eyes, which are then closed and bandaged.

ABSTRACTS

[Studies on Contagious Abortion. (Trans. title.) Itabashi, Ito, *et al. J. Jap. Soc. Vet. Sci.* **17.** 8-10.]

This is a record of epizootiological observations made during three years following an outbreak of contagious abortion on a Japanese stock farm, during which time numerous serological tests were carried out, and unsuccessful attempts were made to control the incidence of abortion by means of vaccination.

In May, 1936, after a slight increase in the number of abortions 59 out of 298 animals gave + *Br. abortus* reactions in serological tests and in June the figure rose to 123 out of 292. Much sterility followed, few animals conceiving with one service while 38 out of 158 remained sterile.

Treatment of heifers with lanolin-live vaccine and nearly all the remaining cattle with a dead vaccine produced no appreciable difference in the abortion incidence. Abortion occurred with equal frequency in + and — reactors, from which it is concluded that vaccines are of little value in controlling an outbreak. Among 77 + reactors 17 aborted and 26 were sterile the following year, showing the possibility of reactors becoming useless for breeding the next year.

Br. abortus was recovered from 15 out of 17 foetuses; in the two negative cases the mothers showed a + reaction. Out of 26 normal calves the organism was recovered from two by animal inoculation, and also from the milk of three aborting cows by cultivation.

Seventy-four out of 88 normally delivering cows showed + reactions, while of 26 sterile cows showing + reactions in 1936, 12 were — in 1937. A + reactor bull did not appear to influence the frequency of abortion among cows covered by it.

A particularly high incidence of + reactors (72 per cent.) among yearlings is attributed to their high susceptibility and stable contamination, rather than maternal milk infection.

It was noted that aborting cows may repeat abortion in the following years.

A. E. K.

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[Results of Vaccination with Brucella abortus strain 19 in an Infected Herd. Haring, C. M. (1939.) *J. Amer. Vet. Med. Ass.* **94.** 587.]

Commencing in September, 1933, with a grossly infected herd of 43 cows, 13 of which were known to be shedding *Br. abortus*, Haring vaccinated the calves and unbred heifers then existing, with a living vaccine prepared from *Br. abortus* strain 19 (U.S.B. Animal Industry). The adult stock was not vaccinated. Since then all heifer calves have been similarly inoculated during their first year. No attempts were made to prevent infection of the vaccinated stock once they were introduced into the milking herd. The original adult stock is gradually being disposed of, but amongst the ten still remaining, there is one which is still an active shedder of virulent *Br. abortus*. The vaccinated animals have produced 146 normal calves and there have been five abortions and five stillbirths, all of which are believed to be due to causes other than *Br. abortus*. Virulent strains of *Br. abortus* (not strain 19) were isolated from two vaccinated cows, neither of which had aborted, but continued recent tests show that these two animals are now free from infection. No evidence was obtained that the vaccine organism was transmitted to any of the old non-vaccinated cows by the vaccinated heifers.

J. S. P.

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[Brucella Infection: The Raising of a Clean Herd from Infected Stock. Evans, S. A. (1937.) Ann. Rep. Vet. Dept. Tanganyika.]

The author briefly records his experiences acquired from personal contact with the events in a herd highly infected with *Br. abortus*. In 1935 it was decided to endeavour to raise a clean dairy herd using the female progeny of the infected herd, while the latter was made completely self contained. The underlying principle in building up the clean herd was the removal to separate accommodation of calves after receiving the colostrum of their dams and the mixed milk of the herd until weaning time. A clean herd was formed in this way in three years.

During the study the following points were noted: (1) that in a herd highly infected with *Br. abortus* 100 per cent. viable calves may be expected within three years of the occurrence of the acute phase of the disease; (2) not a single calf born clean appeared to contract infection from infected bulk milk; (3) agglutinins are absent from the blood of newly-born calves which have not suckled; (4) within five months the blood of all calves, whether infected at birth or not, is negative to the agglutination test.

S. J. E.

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[The Value of Tuberculin Testing in the Control of Tuberculosis. Mohler, J. R., Plum, N., Zeller, H., Glover, R. E., t' Hooft, P. J., and Veenbas, A. H. (1938.) Papers to Thirteenth Int. Vet. Cong.]

Speakers from five countries contributed to a discussion on this important subject.

Mohler states that the intradermal method of administering tuberculin is now used almost exclusively in the United States because of its combined reliability and simplicity. The work of Dorset had shown that tubercle bacilli grew more profusely in a synthetic medium and that

the tuberculin prepared from this medium was more specific in the diagnosis of bovine tuberculosis than the product made from glycerine broth. The chief disturbing factor in the interpretation of the results was the production of non-specific reactions by so-called "skin lesion reactors." The pathology of this condition is described, and when it occurs, reactors are usually isolated as suspects pending a retest. The progress of the campaign to eradicate the disease is shown by the fact that 99 per cent. of all the counties in the U.S.A. are now practically free from infection.

The problem of skin allergy due to the sensiti ation of cattle by other members of the acid-fast group is emphasised by Plum. In Denmark it appears that infection by avian tubercle bacilli is an important factor in the causation of anomalous tuberculin reactions, particularly in young animals. When such infection is suspected a differential diagnosis can be made by the simultaneous infection of avian tuberculin to which cattle react more strongly than to bovine tuberculin.

Zeller (Germany) stressed the importance of the tuberculin test for the eradication of tuberculosis aided by clinical and bacteriological examination. In order to achieve in the future a recognition of an international standardised tuberculin, all nations should adopt the research work of the International Office of Epizootics in Paris.

Glover (Great Britain) reviews the developments in the preparation of tuberculin and the interpretation of the intradermal test. He states that a satisfactory product must possess the following properties—it must be denatured, it must be prepared from suitable strains of tubercle bacilli, it must not be of too high a potency and before issue it must be standardised by testing on both positive and negative cattle. Experiments are described which prove that the avian tubercle bacillus and the bacillus of Johne's disease do sensitise cattle to bovine tuberculins and that this allergy wanes after about 24 weeks. Glover recommends that when it is necessary to retest animals 14 days after the primary test, the injection should be made at a distance not less than 6 inches from the first site in order to avoid zones which may be in a state of diminished sensitivity.

T'Hooft and Veenbas (Holland) discuss the relative merits of the procedures required for the eradication of tuberculosis.

S. J. E.

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[Statistical Comments on Tuberculin Testing. (Trans. title.) Plum. (1939.) *Skand. VetTidskr.* **29.** 105.]

This is a valuable article on the value of tuberculin in the diagnosis of tuberculosis and on the relative frequency of the distribution of the disease in various organs. The author obtained co-operation in making this survey, which embraces the examination of 2,079 animals, from veterinary surgeons in various parts of Denmark. A selection was made of these animals which had given a reaction of at least 3·5 mm. after a single intracutaneous injection of bovine tuberculin prepared by the State Serum Veterinary Laboratory in the manner of old tuberculin. The presence of tuberculosis was found in 96·7 per cent. of the reacting animals and only in 68, *i.e.*, 32·7 per cent. was it not possible to reveal demonstrable lesions.

In the 2,011 infected animals the frequency of distribution of the lesions in some of the most commonly attacked organs was as follows: bronchial glands 1,399, mediastinal glands 1,369, lungs 1,139, pleura 289, mesenteric glands 421, liver 210, peritoneum 107, uterus 46, udder 19. Since the survey included 1,894 cows, the occurrence of tuberculosis of the uterus was therefore found in 2·4 per cent. of the infected animals and of the udder in 1 per cent.

Comparing the number of sites involved in animals in progressive age groups it was found that older animals generally showed a wider distribution of lesions than young animals; this latter group was also found to give a more pronounced reaction to tuberculin than the older groups.

S. J. E.

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[Vaccination Against Udder Pox of Cattle, and its Diagnosis. (Trans. title.) Christen, P. (1939.) *Schweiz. Arch. Tierheilk.* **81.** 53-65 and 108-117.]

The majority of cases of cow pox met by the author in the Berne district are of an atypical form which he terms "abortive udder pox." This condition is mainly sporadic and occurs chiefly in the spring and autumn. It is differentiated from true cow pox by the rapidity with which the vesicles on the udder develop. Full development occurs within 10 to 30 hours. Also there is no depression in the centre of the vesicle and no marked areola around it. The effects on the condition of the milk, etc., would appear to be similar to that of true cow pox.

In an attempt to bring about rapid healing of these lesions, a method of vaccination which had been found to promote a rapid and permanent healing of the lesions of true cow pox was applied. The method comprises the inoculation of a scarified area on the perineum with cow pox lymph. In all cases of atypical cow pox the lesions on the udder receded but recurred after four to six weeks in a less severe form.

Fifteen attempts to transmit the condition to healthy cattle failed, as also did transmission to rabbits.

H. H. S.

[Occurrence of Organisms of the Enteritidis Group in Bovines. (Trans. title.) Lutje. (1939.) *Deuts. tierärztl. Wschr.* April 15th, 1939. 227-234.]

A long account is given of the author's experiences in the isolation of bacteria of the Salmonella group from cattle. The record deals with a period of twelve years up to the end of 1938.

By far the greatest number of bacteria of this group were from calves and the commonest organism was the Kiel type of Gaertner bacillus (*Salmonella enteritidis* var. *dublin*). In a few cases the Breslau type of salmonella (*S. typhi-murium*, *S. aertrycke*) and less frequently *S. enteritidis* var. *rostock* were isolated. The condition in calves is known as calf paratyphoid and is often septicaemic, sometimes with a pneumonia and swelling of the spleen, but, when more chronic, there are signs of focal necrosis in the liver and the gall bladder is infected.

S. enteritidis var. *dublin*, *S. enteritidis* var. *rostock* and *S. typhi-murium* were recovered from adult cows, the former being the most frequent, and in adult animals the condition is often of the nature of an enteritis. There are also cases of infection of the udder (one such is recorded) followed by illness in human beings drinking the milk.

S. enteritidis var. *dublin* was also isolated from foetuses and from specimens of faeces.

[The article confirms the observations of others that the Dublin type of *S. enteritidis* is pre-eminently of bovine origin and its importance is increased because of the danger of this organism for man.]

S. cholerae-suis (*S. suipestifer*) was isolated once from a cow and it is unusual to find this organism in that species of animal.

R. L.

GRASS DRYING

The Ministry of Agriculture announces that steps have been taken to safeguard the position of established grass-drying plants operating in England and Wales. It is felt that plants operating on a factory scale should be given full facilities for carrying on, and that pastures from which their supplies are drawn should be kept in being. The Ministry has accordingly asked county war agricultural executive committees to give careful and sympathetic consideration to any case that may arise where it is desired to reserve grassland for such plants. Similar facilities are to be given to farm grass-driers where it can be shown that a high-grade product is being made under efficient conditions. It is expected that owners of grass-drying plants will be able to obtain fairly readily the fuel required to enable them to operate to normal capacity next season. It is not proposed to encourage the manufacture of new grass driers except where it is clear that the plant will be run to full capacity and so conform to factory conditions.

N.V.M.A. DIVISIONAL REPORT

Veterinary Medical Association of Ireland*

JOINT MEETING WITH NORTH OF IRELAND V.M.A. IN DUBLIN

A general meeting of this Association, to which the members of the North of Ireland Veterinary Medical Association were invited, was held in Dublin on Wednesday, May 3rd, 1939.

Proceedings began with lunch at the Gresham Hotel, Dublin, to which the North of Ireland members were entertained.

After lunch the party went to the Veterinary College of Ireland, Ballsbridge, where the remainder of the programme was carried out.

The attendance included: Messrs. J. J. Condon, President of the Veterinary Medical Association of Ireland, W. E. McDonald, M. J. Byrne, D. B. Mahony, P. J. O'Donoghue, James Dodd, Hugh Dolan, John M. Crowe, J. J. English, W. G. Clarke, L. M. Magee, J. S. MacCann, James J. O'Brien, M. J. MacClancy, E. J. Phair, J. D. O'Connor, D. Reeves, G. T. O'Reilly, F. St. G. Sleith, W. B. McAleer, P. A. McGeady, J. E. Kenny, J. J. Collins, Miss H. Bisset, C. B. Adams, T. Scott, B. D. Taylor, F. S. Hart, P. F. Dolan, R. P. Byrne, T. F. Connolly, J. J. Cosgrove, Denis A. Doherty, A. A. Donnelly, G. T. Dunne, F. A. Heney, J. Heney, E. V. Kelly, N. H. Lambert, J. J. K. Linton, E. W. Little, Sean O'Donovan, J. A. Nicholson, J. J. O'Connor, J. H. Norris, J. P. Nowlan, A. F. O'Dea, M. Purcell, F. S. Ringwood, P. A. Rogan, F. R. Staples, H. Briggs, T. G. Browne, J. F. Timoney, W. R. Kerr, Angus Foggie, P. L. Shanks, P. E. Mullaney, William Nyhan, J. D. Whitty, P. A. McCorry, P. Harnett, D. F. McCarthy, W. Kearney, H. G. Lamont and J. M. Murphy.

Films and Demonstrations

Sound films on "Sterility in the Mare" and "Sterility in the Cow" were shown by Messrs. Bayer Products, Ltd. These films took 1½ hours to show and were highly interesting and instructive.

Laboratory and other demonstrations were given by the staff of the Pathology Department of the Veterinary College of Ireland and Mr. Martin J. Byrne, lecturer in surgery.

Laboratory Demonstrations.—The staff of the Pathology Department of the Veterinary College demonstrated to the meeting methods of collecting specimens for laboratory diagnosis and of

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conducting simple tests that might be made by practitioners themselves.

Mr. P. E. Mullaney, lecturer in Pathology and Bacteriology, made an analysis of urine to demonstrate common changes and referred to the significance of these from the clinical point of view. He also showed the meeting some interesting specimens from the larger animals.

Mr. F. St. G. Sleith, Lecturer in Parasitology, carried out an examination of faeces for evidence of worm infestation and emphasised the necessity for caution in interpreting laboratory reports on worm-egg counts. These he said should be complementary to clinical symptoms and not taken as a guide in themselves. He also asked practitioners to help him to compile reliable data on the value of egg-counts as an index of pathogenesis by sending samples and a full history of the cases as outlined in his instructions which he circulated to the profession when reporting on samples.

Mr. Adams, the Poultry Pathologist, and Professor Kearney, spoke on poultry diseases and exhibited a number of specimens and methods of testing poultry for tuberculosis and bacillary white diarrhoea.

Mr. Martin J. Byrne, Lecturer in Surgery, first demonstrated the induction of anaesthesia in the dog (subject—a 30 lb. fox terrier) by the intravenous injection of nembutal. Mr. Byrne observed that it was particularly indicated for operations on the mouth and its vicinity; it was contra-indicated in the case of animals suffering from cardiac, respiratory, hepatic or renal affections. He then described the sites at which the injection may be made, demonstrating how best the external saphenous and radial veins may be distended, dealt with dosage and demonstrated the administration of the drug.

The application of cellona casts was then demonstrated on the left fore limb of the same dog by the usual method. When the casts had set an elastoplast bandage was applied to their exterior.

Finally, Mr. Byrne demonstrated the destruction of a dog (mongrel; 35 lb. in weight) by the injection of a saturated solution of magnesium sulphate intravenously. The demonstrator observed that magnesium sulphate is soluble 1 in 1·5 of water, thus a stock solution can easily be prepared by dissolving 1 ounce of the crystals in 3 ounces of water. 10 c.c. of this solution were quickly injected into the radial vein and the animal, which evinced no pain, was dead within one minute.

This method of destruction, stated Mr. Byrne, is very suitable in practice as it is cheap, painless and efficient.

All the members present were then entertained to tea.

Paper.—After tea Prof. A. F. O'Dea, M.R.C.V.S. D.V.S.M., read a paper entitled, "Remarks on some of the Diseases of Dairy Cattle." The discussion was opened by H. G. Lamont, M.Sc., M.R.C.V.S., Stormont, Belfast, several members taking part. [Professor O'Dea's paper, and a report of the ensuing discussion and of the essayist's reply, are reproduced at the commencement of this issue.—*Editor.*]

As it was very late when the discussion on the paper had finished it was decided that the business portion of the meeting be left to the Council to deal with at its next meeting, the Council being given all the necessary powers from the General Meeting for the purpose.

J. M. Murphy, *Hon. Secretary.*

In Parliament

The following are among the questions and answers recorded in the House of Commons recently:—

Horses (Purchase)

Major Sir Jocelyn Lucas asked the Secretary of State for War whether he will give owners of suitable horses who are desirous of selling at a reasonable price an opportunity to register their names and addresses, together with the number and particulars of animals available, thus obviating the necessity of impressing or buying from unwilling sellers, and denuding some districts while others are left comparatively untouched?

Mr. Hore-Belisha: Yes, Sir. The War Office will be most happy to act upon this suggestion.

Wing-Commander James asked the Secretary of State for War what facilities for redress it is proposed to offer to horse owners whose valuable horses were taken by his Department, in some cases in their absence, without any notification to them at the time or subsequently, either that the seizure was not compulsory, or that they had any right of appeal against the low price given, and who consequently were unaware of their right of appeal to a county court until the statutory period had elapsed?

Mr. Hore-Belisha: I am informed that the purchase of horses was mainly affected by agreement, and that impressment had to be resorted to in only about 3 per cent. of the total number of cases. Where impressment was used, a notice was served on the owner which clearly informed him of his right of appeal on the question of price.

Wing-Commander James asked the Secretary of State for War whether he is aware that in some cases owners of commandeered horses were instructed, or their servants were instructed in their absence, to have the animals shod, and to provide halters, before delivering them to the military authorities; that no compensation for this cost has been offered, whether the animals were taken or not; and whether he will have his decision upon this point published in the agricultural Press?

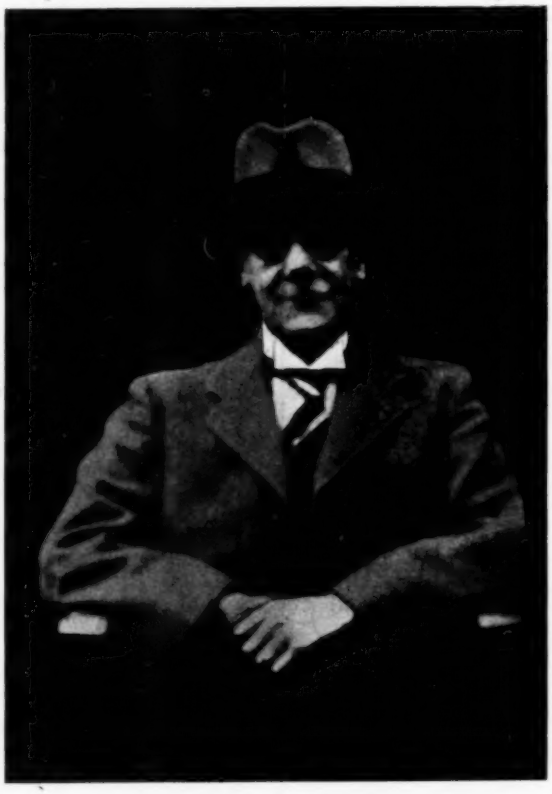
Mr. Hore-Belisha: If a purchaser gave instructions for a horse to be shod after he had bought it, he should have paid for the cost. He should also have paid for any halters which he took over. I am not aware that any instructions of the kind mentioned were given before animals were taken.

GEORGE D. LANDER, D.Sc.

A MEMOIR

[Contributed]

Dr. George Druce Lander, as announced in an earlier issue, died at Ashford, Kent, on October 25th, 1939. His passing has turned yet another page in the story of the old London College, and its stalwarts of the past. Dr. Lander was born in London in the year 1874, and he attended Wilson's Grammar School, at Camberwell. His great ability was manifest early in life for, while still at school, he won an open scholarship to Jesus College, Cambridge, and at the same time a further open scholarship to the Royal College of Science, South Kensington. He chose to accept the latter, and in 1893 he obtained the Bachelor of Science degree with honours in Chemistry. He then proceeded to the University of Aberdeen and became research assistant to Professor Japp; later he occupied a similar post in the University of St. Andrews, serving this time under Professor Purdie. While at St. Andrews he took the degree of Doctor of Science. In 1900 he was appointed to a lectureship at the University College, Nottingham, under Professor Kipping. While at Nottingham he took the Doctor of Science degree of the London University.



[*Reproduced from a snapshot by J. E. Hancock, R.V.C.*

In 1903, on the retirement of Professor Bayne, he was appointed Professor of Chemistry and Toxicology at the Royal Veterinary College, London, and so began his long association with the veterinary profession. When he entered upon his duties at the London College he was a man of a slender, youthful and cultured appearance. The students of that time were high-spirited, and given to frequent ragging, and somewhat averse to giving their whole attention to the subject of which he had charge. Lander soon had them in hand, and it was not long before they reacted to the charm of his character and culture, and his prowess as a teacher. Students are said to be the best judges of a man, and so his competence, simplicity and lucidity soon provided for a genuine understanding and sympathy between pupil and teacher. Not one minute of his lectures was boring, his demonstrations always came off for they were well prepared, his interjections and mannerisms provided that little spice of humour which all good teachers possess, and his notes and diagrams on the old glass board were models of artistry and good handwriting. He made chemistry a live subject. Practical classes in the old laboratory became things of interest and even of delight, for, although he was forever hovering around, and always approachable, he interfered as little as possible with the experiments in progress, in order to encourage and stimulate his students to do things for themselves.

Lander also took a great interest in the social side of the College, and in sport. In every way he became part and parcel of the collegiate life. Before he came to the Veterinary College, Lander had built up a reputation as a sound chemist and the book "Systematic Inorganic Chemistry"—a text-book for advanced students—of which he and Dr. R. M. Caven were joint authors, is still recognised as a standard text-book. When he came to the Veterinary College he turned his attention to Toxicology, and he became the recognised expert in this subject. Lander's "Veterinary Toxicology," published in 1912, was the result of this work, and it is recognised as the standard text-book on the subject.

He was appointed consulting chemist to the Jockey Club in 1913: similar appointments to the Royal Calcutta Turf Club and the Royal West

India Turf Club followed, and he held these posts until his death.

During the Great War, Dr. Lander served on the Government Committee which was formed, under the presidency of Lord Moulton, to investigate the production of explosives. He was second technical advisor to Lord Moulton. In connection with this work, Dr. Lander spent some months in the U.S.A., and as a result the manufacture of T.N.T. was placed on a sound footing. Many synthetic chemical substances which had previously been imported from Germany were investigated, in order that they might be produced here in an effort to capture the German fine chemical trade for England.

In 1917 he was manufacturing phenacetin in this country. In his war work, Lander had the help of his wife. In order to be of the utmost service to her husband, Mrs. Lander took an honours Degree in Science (Chemistry) and accompanied him on his mission to America, where her services were invaluable.

In 1921 Dr. Lander retired from the College. He went to Kent and settled first at Stone-in-Oxney, and later at Tenterden. He continued his private practice as a consulting chemist and toxicologist and took a great interest in local affairs. He was a local councillor, Chairman of Toc H, and of the Weald of Kent District Committee. Latterly he devoted much time to A.R.P. work. He was Gas Detection Officer for Tenterden and Cranbrook area, and he had trained a squad for the detection of poison gas.

After he retired from the Royal Veterinary College, much of Lander's time was occupied in farming and commercial interests, but he never lost touch with the profession. Since 1923, he had acted as examiner in Chemistry for the Royal College, earning both the respect of the students and the appreciation of the Council of the R.C.V.S.

In personal appearance, Lander had the poise of a scholar. His clothes were invariably of the tweed type and blessed with many wrinkles. He was an inveterate cigarette smoker. He would walk sharply along with his head slightly bowed as if in deep contemplation. He was a good conversationalist, and well informed in a great variety of matters. His speech was somewhat staccato; he was not loath to give expression to his feelings. In his company one felt the presence of a great brain and an honest and kindly man.

It is good to know that his end came with relative suddenness, and that he was able to die literally in harness. Lander would have wished for nothing better, and we may rest assured that when the time came, he met it with that same stoical courage as he had exhibited during his life.

The directors of the International Horse Show have decided that it will not be possible to hold the Olympia Show next year.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Nov. 30th.—Annual General Meeting of the Dumfries and Galloway Division, N.V.M.A., at Dumfries, 1.15 p.m.

Dec. 4th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

Dec. 4th.—R.C.V.S. Membership Examinations—Written.

Dec. 8th.—R.C.V.S. Membership Examinations—Oral—begin.

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Supplementary Supplies of Petrol for Veterinary Surgeons

We have received the following from one of the liaison officers working on behalf of the members of the profession with Divisional Petroleum Officers and we would ask our readers to read this carefully and act accordingly.

"There are some aspects in which veterinary surgeons seeking the assistance of liaison officers could be more helpful. If the liaison officer is to be in a position to state a case, he must have information as to the horse-power of the car or cars in use, the average normal mileage per month and details of supplementary rations already granted. It would also be helpful if veterinary surgeons would seek the assistance of liaison officers before their supplies are bordering on exhaustion. Further, if through the medium of the *Veterinary Record* it were possible to secure the lodgment of appeals to liaison officers more or less simultaneously, it would be helpful by saving repeated visits and representations to the Divisional Officer. Veterinary surgeons will know, at a very early date after the commencement of the next rationing period, the quantity of petrol allotted to them. They can also estimate their probable requirements over the rationing period. It seems reasonable to suggest, therefore, that they should lodge their appeals with the liaison officer within, say, 14 days of the commencement of the rationing period. The liaison officer would then be in a position to deal with the majority of cases, in which he is asked to help, at one meeting with the Divisional Officer. The receipt of applications in 'penny numbers' is not helpful either to the liaison officer or to the Divisional Petroleum Officer.

"These liaison officers are rendering invaluable service to members of the veterinary profession; they are devoting a very considerable amount of time to this work and it behoves every one of us to show our gratitude by making their task as light as possible."

PERSONAL

Marriages.—Greatorex—Dymock.—Quietly, on Friday, November 17th, 1939, at St. Margaret's Church, King's Lynn, John Charles Greatorex, M.R.C.V.S., to Margaret Agnes Dymock.

Stuckey—Saunders.—On November 5th, at St. Michael's Church, Bray-on-Thames, Derek Richard Stuckey, B.C.L., son of the late Robert Algernon Stuckey and Mrs. Eva Jarvis, of Twyford, and Gladys Muriel Saunders, M.R.C.V.S., daughter of the late Thomas Alfred Saunders and Mrs. Amy Saunders, of Caversham.

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R.C.V.S. OBITUARY

Byrne, Francis Bernard, 2, Summerhill Terrace, Cork, Eire. Graduated New Edinburgh, May 22nd, 1895. Died October 25th, 1939; aged 73 years.

Whitehead, George, Bank Foot House, Batley, Yorks. Graduated New Edinburgh, April 14th, 1880. Died November 9th, 1939; aged 83 years.

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General Obituary

Edgar.—At Oswie, Whithorn, on November 11th, Janet McDowall, beloved wife of Archibald Edgar, M.R.C.V.S.

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R.C.V.S. ANIMAL MANAGEMENT EXAMINATION

List of Successful Candidates

(*Continued from page* 1376)

Glasgow. — Brocklehurst, F. B. (credit), Buchanan, W. G. (credit), Buntain, D., Clow, D. G., Crichton, J. A., Dalling, D. D., Dewar, H. D., Douglas, C., Ferguson, Thos., Gibson, J. C. (credit), Graham, D. T., Gregor, Alec., Howie, T. W. T., Humphrey, W., Hunter, Miss A. M., MacKenzie, G. J., Mackie, G. C., Macpherson, L. H., McVinnie, A. J., Morton, A., Paneth, Miss B., Pearson, J. K. L., Pollock, J. C., Scott, K. E., Serth, G. W. (credit), Spiers, A. G., Stewart, W., Wilson, R. M.

Edinburgh.—Beattie, I. S., Bell, R. L., Bruce, William; Cameron, J. A., Carr, Peter; Coombs, R. R. A., Cox, R. L. (credit), Dawson, C. D., Dovey, J. S., Evans, H. J., Ferguson, James (credit), Garside, Peter; Hall, J. G., Harper, W. O., Hooton, J. K., Hunter, T. S., Hutchinson, R. A., Lindley, P. E. (credit), McGirr, J. L., McIlroy, Gingles; Mackay, Allan; McKinnon, M. M., Maclachlan, G. K., McMillan, F. H., McNaughton, R. R. (credit), McTaggart, H. S., Mann, R. V. S., Melrose, D. R., Mulki, F. (credit), Newsam, T. J., Philp, J. McL., Procter, F. D. (credit), Ross, Alexander; Routledge, D. B., Shaw, W. B., Shilliday, E. A., Smith, G. F. (credit), Spence, Tom; Stead, P. Y., Stokes, G. M., Stuart, Peter; Watson, A. H., Whitney, E. W., Wishart, Graham.

London.—Berry, M. H., Chaudhary, S. A., Clark, Miss C. L., Hayhurst, R. J., Holder, J. D., Kendall, S. B., Matthews, A. C., McNaught, T. T., Nye, S. S., Ogle, R. G., O'Neill, A. G. J., Pybus, J. S., Vaughan, A. W., Welch, A. G.

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LEGAL NOTES

"Stop" Ticket Removed from Carcases.—At the Guildhall Justice Room on November 16th, before Alderman Sir Charles McRea, Ralph Leslie Norman Whitear, aged 20, a dealer in cattle, of Duppas Hill Lane, Croydon, was summoned for sending to the Central Meat Market, West Smithfield, on August 17th, two carcases of veal which were deposited for sale and intended for the food of man, and were afterwards seized as being diseased, and so condemned. A plea of "Guilty" was entered.

Mr. W. E. J. McDonnell, prosecuting on behalf of the City Corporation, said the local sanitary inspector put a "Stop" on two of the carcases which he found to be infected with tuberculosis. This meant that they should not be dealt with without the consent of the sanitary inspector. Whitear removed the "Stop" and sent the meat to Smithfield, where it was seized.

Mr. W. T. Ricketts, defending, said that his client was bound to plead guilty, although he never had any intention of foisting bad meat on the London market. He removed the detention tickets from the carcases because he thought they had been left in mistake by the Croydon officer. He was only 20, and in any case had to suffer the total loss of these two carcases.

Sir Charles McRea said he accepted the suggestion that Whitear did not deliberately send to London meat which he knew to be diseased, but the offence was serious. He would be fined £2 and six guineas costs.

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H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses—London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

	Price net s. d.	*Post free* s. d.
Health, Ministry of: *Public Health and Medical Subjects Report 90.* A study of the Nasopharyngeal Bacterial Flora of Different Groups of Persons observed in London and South-East England during the years 1930 to 1937 (by Edith Straker, M.B., B.Sc. (Lond.). D.P.H., A. Bradford Hill, D.Sc. Ph.D., and R. Lovell, Ph.D., M.R.C.V.S., D.V.S.M.); together with some Observations on the Occurrence of *H. influenzae* in the Trachea (by A. B. Rosher, M.R.C.V.S., L.R.C.P., D.P.H., and W. T. Cole). April, 1939. (32-195-90) ...	2 0	2 2

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Mr. Walter Elliot, Minister of Health, in a circular to housing authorities, urges that in view of the importance at the present time of increasing the food supplies of the country, they should consider how far they can reasonably remove or relax any existing restrictions on the keeping of poultry and pigs by tenants on their housing estates.